Chapter 1

Feature Overview and Model Description

This chapter describes the core features available on all five ***CDQPrima*** *models as well as the individual model features*

1. CDQPrima Overview

The ***CDQPrima*** is an audio codec that is used to compress and decompress audio for transmission over a digital facility such as ISDN, dedicated data service, and satellite. Along with its audio compression capabilities, the ***CDQPrima*** has a rich set of monitor and control (M&C) features made possible by a powerful on-board control processor and special command language. These M&C capabilities give you unique capabilities you will not find in audio-only codecs.

There are five models in the ***CDQPrima*** series, each sharing the same audio compression hardware and coding technology. The five models differ only in standard and available features. Below is a chart of the ***CDQPrima*** features.

CDQPrima **Model**	**110**	**120**	**210**	**220**	**230**
Compression Algorithms					
CCS MUSICAM® with 'Quick-Frame'	X	X	X	X	X
Low Delay ISO/MPEG Layer II	X	X	X	X	X
ISO/MPEG Layer II	X	X	X	X	X
ISO/MPEG Layer III	X	X	X	X	X
Independent Mono Operation	X	X	X	X	X
CCITT G.722	X	X	X	X	X
16, 24, 32 & 48 kHz sampling rates	X	X	X	X	X
Additional algorithm capacity	X	X	X	X	X

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CDQPrima Model	110	120	210	220	230
Audio I/O, SMPTE & Ancillary Data					
20 Bit A/D and D/A converters	X	X	X	X	X
Variable input and output levels	X	X	X	X	X
Gold plated Neutrik® XLR connectors	X	X	X	X	X
AES/EBU, S/PDIF digital audio I/O	• DB9	DB9	XLR	XLR	XLR
Automatic rate adaptation	X	X	X	X	X
Optical Digital I/O			•	•	•
Spectrum analyzer & phase display					X
SMPTE Time Code			•	•	•
Asynchronous ancillary data	X	X	X	X	X
Second RS232 ancillary data channel			X	X	X

CDQPrima Model	110	120	210	220	230
Mechanical Features					
Dimensions: 19” Rack Mount	1U high	1U high	2U high	2U high	2U high
Digital Interface Module slots	1	1	3	3	3
World Power Supply, rear power switch	X	X	X	X	X
Dial and control keypad	X	X	X	X	X
Backlit LCD display	character	character	character	character	graphic
Adjustable display contrast	X	X	X	X	X
Keypad beeper and audible alarm	X	X	X	X	X
Thermostatically controlled cooling fan	X	X	X	X	X
Digital LED average & peak VU meters		X		X	X
L/R correlation & stereo image display		X		X	X
Scrolling text messages on VU meters		X		X	X
Intelligent headphone monitor system		X		X	X

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CDQPrima Model	110	120	210	220	230
Additional Options Available					
ISDN/X.21/RS422/V.35 DIF modules	• 1	• 1	• 3	• 3	• 3
Windows® remote control software	•	•	•	•	•
Psychoacoustic parameter adjustment	X	X	X	X	X
ITU-T J.52 error protection	•	•	•	•	•

X = always present · = hardware/software option; for example, · 3 means optional 3

***CDQPrima* Model**	**110**	**120**	**210**	**220**	**230**
Command and Control					
68020 Integrated Support Processor	X	X	X	X	X
Software update via RS232	X	X	X	X	X
J.52 IMUX BONDING	X	X	X	X	X
H.221 transport protocol	X	X	X	X	X
Extensive on-line help	X	X	X	X	X
Headphone select and level control keypad		X		X	X
4-button cue keypad		X		X	X
Hot keys & extended feature keypad					X
Full remote control via RS232 & RS485	X	X	X	X	X
Front panel RS232 remote control port		X		X	X
Optically isolated remote control inputs	• 4	• 4	• 4 or 8	• 4 or 8	• 4 or 8
Dry floating relay contact outputs	• 4	• 4	• 4 or 8	• 4 or 8	• 4 or 8
Virtual control lines connecting each unit	12	12	12	12	12
RS232 control port	X	X	X	X	X
Second RS232 control port		X		X	X
RS485 control port			X	X	X
Programmable summary alarm relay	X	X	X	X	X
Programmable silence detector	X	X	X	X	X
Programmable peak level detector	X	X	X	X	X
Bit error rate detector	X	X	X	X	X
Out-of-frame detector	X	X	X	X	X
Storage for 20 TA configurations	X	X	X	X	X
System 'Snapshot' Speed-Dial editing	X	X	X	X	X
'User Profile' custom system defaults	X	X	X	X	X

X = always present · = hardware/software option; for example, · 3 means optional 3

The five models of the ***CDQPrima*** family can be divided into two broad categories, the 100 and the 200 Series. The 100 Series is 1 unit (U = 1.75 inch, 4.45 cm) high and can hold 1 Digital Interface Module (DIM). The 200 Series is 2U (3.5 inch, 8.9 cm) high and holds up to 3 DIMs. Each DIM connects the ***CDQPrima*** to a digital transmission facility.

A simplified functional block diagram for all ***CDQPrima*** models is shown below. A high-level diagram can be found in the ***CDQPrima*** Technical Reference Manual:

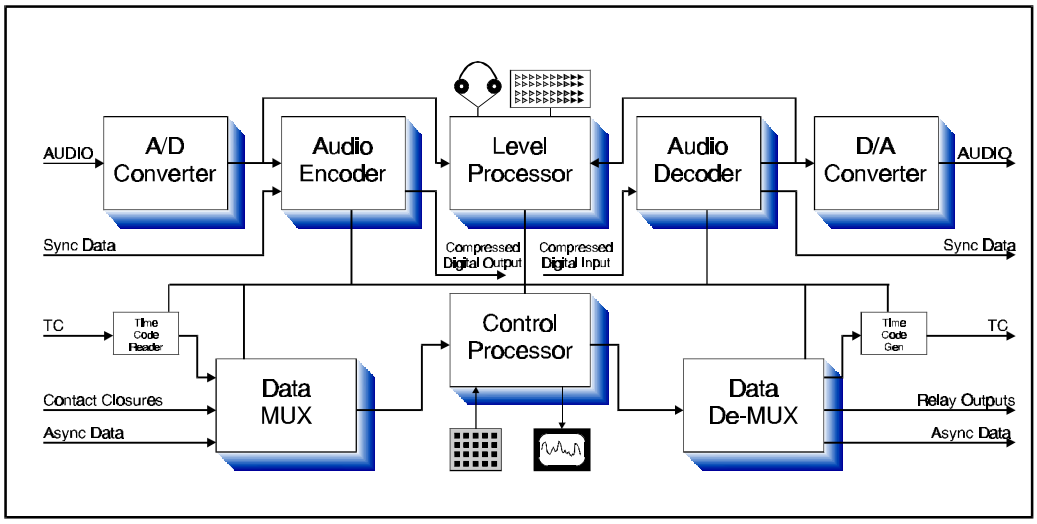

Figure 1-1 CDQPrima Functional Block Diagram

1.1 Model 110 Description

The ***CDQPrima*** Model 110 is conveniently packaged in a 1U – 1.75 inch (4.45 cm) by 19 inch (48.3 cm) – rack mount unit. The Model 110 provides a rich set of basic features that are included in the entire ***CDQPrima*** family, such as stereo bi-directional audio, an LCD display, and a control keypad with beeper. The keypad allows operation of all the codec features. The Model 110 also includes a rear panel RS-232/RS-485 remote control connector, provisions for four optional optically isolated switching inputs and four control relay outputs. The Model 110 may also be optionally equipped with AES/EBU or S/PDIF digital audio inputs and outputs. As with all ***CDQPrima*** Series codecs, the capacity for ancillary data is also included. It also contains a sophisticated, programmable audio level sensing and adjustable input and output levels. All 100 Series models can be equipped with four relay outputs and four optically isolated inputs. One Digital Interface Module (DIM) must be specified to interface with digital networks.

1.2 Model 120 Description

The ***CDQPrima*** Model 120 builds on the Model 110 by adding an LED level display, front panel headphone output, a front panel RS-232 remote control port, and includes AES/EBU digital audio I/O as standard equipment.1

[1]The AES/EBU digital audio interface on the 100 Series uses a DB9 connector due to space considerations. An adapter cable is available to convert from the DB9 to standard XLR connectors.

The LED level display provides a sophisticated level meter with peak hold, as well as stereo image and stereo correlation capabilities. The LED level display can also display scrolling text messages to the user. Such messages, which can also be sent to the far end unit, are helpful in alerting and cueing.

The Model 120 also adds additional keys to the keypad for menu navigation, remote cueing, and headphone source and level controls.

1.3 Model 210 Description

The features of the ***CDQPrima*** Model 210 are similar to the Model 110, with several additional enhancements. The 200 Series is housed in a 2U — 3.5 inch (31.1 cm) by 19 inch (48.3 cm) — enclosure that will hold up to three Digital Interface Modules for interfacing to digital networks. AES/EBU or S/PDIF digital audio I/O is standard. On all 200 Series Models, the included AES/EBU connectors are industry standard XLR, and no adapter cable is necessary. The 210 can be equipped with up to eight optical isolators and eight relays. Industry standard SMPTE time code is optionally available as is EAI-J standard optical AES/EBU or S/PDIF I/O. All 200 Series models are equipped with separate ports for RS-232 and RS-485 ancillary data on the rear panel, and can support two individual RS-232 ancillary data paths.

1.4 Model 220 Description

The features of the ***CDQPrima*** Model 220 combine the features of Models 120 and 210 in a 2U high housing, which can hold up to three Digital Interface Modules. Up to eight optical isolators and eight relays may be installed. AES/EBU or S/PDIF digital audio I/O is standard. As with all models in the 200 Series, industry standard SMPTE time code is optionally available as is EAI-J standard optical AES/EBU or S/PDIF I/O. Separate rear panel RS-232 and RS-485 ancillary data ports are standard on all 200 series models.

1.5 Model 230 Description

The ***CDQPrima*** Model 230 provides all the features of the Model 220 and adds a graphics display for advanced audio measurements. A real-time spectrum analyzer and Lissajous phase display are included to provide complete monitoring of both the encoded and decoded audio. The Model 230's larger graphical display aids in setup by providing a larger menu viewing window. The 230 also contains an enhanced status display and keypad that gives you quick access to status and measurement functions plus eight user programmable hot keys.

1.6 *CDQPrima* Features

Your feature set available in your ***CDQPrima*** makes it the most powerful audio codec available anywhere. This remainder of this chapter contains a summary of ***CDQPrima*** features that are current through the date of this manual. If you believe a new feature would be helpful in your application, we encourage you to contact us with your ideas. One of ***CDQPrima's*** most important features is that it can easily be field upgraded, and we may be able to easily make your idea a reality.

Noting the software version as your ***CDQPrima*** boots can identify software and hardware versions. For example, hardware revision 6 running software revision 34 will be indicated by "6.34" appearing on the display during system boot. Please feel free to check with us for the current software version number. You can also check for the latest software on our Web Site, www.musicamusa.com.

The beginning section of this chapter includes summary information only. Later chapters of this Users Guide, and the ***CDQPrima*** Technical Reference Manual will describe the available features in more detail, including the commands needed to activate or change the features.

1.6.1 Mechanical Features

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All ***CDQPrima*** models are housed in an attractive 19" black anodized, rack mount case, and all are equipped with a quiet, **thermostatically controlled** cooling fan for protection. All ***CDQPrima*** models contain an international power supply that does not need any jumper or switch setting adjustments for voltage or frequency changes. The power switch is located on the rear panel to prevent accidental shutoff.

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All models except the 230 have a backlit alphanumeric LCD display for viewing and changing system settings. The model 230 has a larger LCD graphics display that also includes a built in real-time spectrum analyzer and phase display. **The display contrast can be adjusted over a wide range for ease of viewing from any angle**. All models can be configured and used from the built in soft-touch keypad. LED average and peak VU meters, left/right correlation, and stereo image displays are standard on models 120, 220 and 230, as are LED status indicators, front panel headphone and RS232 remote control connectors. The LED displays can be used to display alphanumeric messages.

1.6.2 Audio and Time Code

All ***CDQPrima*** models use 20-bit Analog to Digital (A/D) converters for high quality, low noise and low distortion audio conversions. In addition, all ***CDQPrima*** models use high quality gold plated Neutrik® XLR connectors for analog audio I/O. The ***CDQPrima***'s +18 dBu maximum input level assures ample headroom for all applications without the need for audio limiters. New with revision 34/6.34 is the ability to adjust this maximum input and output level by 3 or 6 dB, thus adding up to 6 dB of attenuation (or gain) when using any Layer II algorithm.

For digital audio I/O on the 100 Series models, gold plated DB9 connectors are used. Gold plated Neutrik XLR connectors are used for digital audio I/O on all 200 Series models. Both AES/EBU and S/PDIF digital formats are supported. Optical digital audio connectors are available on all 200 Series models. Automatic rata adaptation is available on all ***CDQPrima*** models.

An optional SMPTE time code reader and re-generator can be added to all 200 Series models. SMPTE time code can thus be sent simultaneously with the compressed audio as ancillary data to the far end, where it can be displayed on the front panel LCD display, and is output to a rear panel connector. The ***CDQPrima*** automatically senses and regenerates the time code rate, so no external control is necessary. The SMPTE time code feature can be used with all compression algorithms except G.722, which does not support time code.

1.6.3 Ancillary Data

All ***CDQPrima*** models can transmit asynchronous ancillary data to the remote location along with the compressed audio data. Ancillary data can be data input to the rear panel ancillary data connector, time code, virtual events, and switch closures, etc. Ancillary data is encoded along with the audio and sent to the far end, where it is decoded and demuxed to the proper location. Unlike other codecs that support ancillary data, all data is split evenly between left and right channels to assure equal fidelity.

Direct ancillary data, i.e., data that is not muxed with other data, can be sent at bit rates up to 38,400 bps. Muxed ancillary data can be up to 19,200 bps. The ancillary data can be used for remote control of peripheral equipment at the far end; for example, tape recorders can be stopped and started using ancillary data. Since the ancillary data is

sent in the audio bit stream, the bits used for the ancillary data are not available for audio data. Therefore it is not advisable to use a high ancillary data rate with a low transmission rate. One key feature, however, is that if no ancillary data is present, no bits are robbed from the audio data, even if the ***CDQPrima*** is configured to send ancillary data. Bandwidth is used only as needed.

CDQPrima 200 Series models can send two independent RS232 ancillary data streams. The combined bit rate for both of the RS232 paths can not exceed the 19,200 bps maximum allowed by the multiplexer. The ***CDQPrima***'s ancillary data features can even be used when connecting to other manufacturers codecs.

1.6.4 Audio Compression

The premier audio compression algorithm available in all ***CDQPrima*** Models (and all other MUSICAM USA MPEG Layer II compatible codecs) is MUSICAM USA's enhancement of the industry standard ISO/MPEG Layer II coding, known in the USA as MUSICAM®. Since the enhancements apply to the encoder side only, using the MUSICAM USA enhanced algorithm allows all MPEG Layer II decoders to reproduce MUSICAM—enhanced audio.

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CDQPrima's new low-delay MPEG Layer 2 decoder yields 50% lower delay at any bit and sample rate for all single-line connections

Industry standard MPEG Layer III, industry standard MPEG Layer II, and ITU-T G.722 encoding and decoding is also supported on all models. In addition, the ***CDQPrima*** codecs can also communicate with a variety of codecs manufactured before industry standardization. Since encoding and decoding is accomplished in software, your new ***CDQPrima*** can be field upgraded to incorporate improvements in compression algorithms.

Audio sampling rates of 16, 24, 32 and 48 kHz are standard. Note that not all algorithms support all sampling rates, and the ***CDQPrima*** cannot be configured to an invalid combination.

The psychoacoustic parameters used by the enhanced MPEG Layer II compression algorithm, such as those mentioned in the ***CDQPrima*** Technical Reference Manual, can be fine-tuned by the user, a MUSICAM USA exclusive.

1.6.5 Control Features

All ***CDQPrima*** models can be configured and controlled from the front panel using the built in LCD display and soft-touch keypad. The basic

keypad on the 110 and 210 Models contains the cursor, alphanumeric, dial and speed dial keys required for all setup and control functions. The extended keypad on the 120 and 220 Models adds direct entry into the Common, Encoder, Decoder, and Maintenance menus, headphone control, and cue functions, discussed in later sections. The enhanced keypad, available only on Model 230, adds single button changes of LED display functions, single button spectrum analyzer and phase displays, and 8 user definable hot keys.

Full RS232 and RS485 remote control is possible using an external computer or terminal connected through the ***CDQPrima***'s remote control port. Models 120, 220 and 230 also include a front panel RS232 port that can be used to configure your ***CDQPrima*** with a hand-held or laptop computer. A Windows® setup and control program is available for friendly, point—and—click configuration and control of all models, and includes many special features. When using an external terminal or computer for control, full on-line help is available. Remote keypads, with large LCD displays and buttons, are available as an after-market option from other manufacturers. Contact MUSICAM USA for further details

Far end remote control is possible using the ancillary data features available on all ***CDQPrima*** models or by using in-band remote control. There are also twelve virtual control lines connecting each ***CDQPrima*** unit. Directly entered commands can be sent to the far end ***CDQPrima*** or ***Prima LT***™, as well as automatic control commands generated internally as 'Virtual Actions' in response to internal or external events. External events include optional optically isolated inputs, which can be used to sense alarms from peripheral equipment, as well as 'cue' control from the far-end ***CDQPrima***. Internal events include bit-error, out-of-frame, silence detection, or any one of four internal timers.

The ***CDQPrima*** can not only be controlled remotely, but can also be used to control external devices. Up to eight optional dry floating relay contacts are available and controllable locally or remotely. Commands can also be sent to external equipment as ancillary data or virtual actions or, in custom applications, through the RS232 or RS485 control ports. ***CDQPrima*** can now also send internally stored RS232 command sequences to the far-end RS232 port

1.6.6 Pre-Programmed Quick-Configurations

All ***CDQPrima*** models use the ***CDQPrima*** speed dial directory to create and store Quick Configurations. Since any speed dial entry contains all the information needed to complete a link to a far end codec; you can use a non-dialing speed dial entry to instantly configure all line, algorithm and rate parameters. You can therefore completely change the configuration of your ***CDQPrima*** with as little as one button press, even if you are *not* using an internal terminal adapter.

We have pre-programmed your ***CDQPrima*** with more than three dozen of the most popular configurations, detailed in Chapter 6. In addition, you can instantly create your own Quick Configurations and store them for later use. Since these Quick Configurations do not dial any numbers, they can be used even if an internal terminal adapter is not used.

You can also use one of the Quick Configurations as a template for creating your own speed dial entries. Simply edit a configuration, changing the name, adding actual numbers to dial, and save it as your own.

In addition, all ***CDQPrima*** codecs come pre-loaded with our 24-hour Music Line numbers. You can now confirm your ***CDQPrima*** configuration and set up simply by speed-dialing our Music Line numbers at either 56 or 64 kb/s monaural, or 112 or 128 kb/s joint stereo. For accessing the Music Line numbers from outside North America, simply edit the appropriate speed dial entry and add the appropriate United States international dialing code to the numbers that are already present.

1.6.7 Auto Detection of Incoming Calls

Also available is the ability to program your ***CDQPrima*** to detect incoming call algorithms and formats and reconfigure accordingly. This can be an invaluable feature when the receiving ***CDQPrima*** is in an unattended location.

Using the power of ***CDQPrima*** Logic Language (PLL) with its Event—to—Action Logic and Virtual Actions, it is possible to program your ***CDQPrima*** to auto configure on up to four different device formats. This ability has *not* been pre-programmed into your ***CDQPrima***, however, using the example shown in the ***CDQPrima*** Technical

Reference Manual as a guide, you should have no trouble implementing this feature if desired.

1.6.8 On-Site Software Upgrades

One of the most important features of your ***CDQPrima*** is remote software updates via RS232 or RS485. Units do not need to be returned for software upgrades. New software can be loaded either from an attached terminal, or from a remote location through a modem.

1.6.9 Digital Interface Modules

The ***CDQPrima*** architecture uses plug-in modules to interface to the digital transmission network. 100 Series models can hold one module, while the 200 Series can hold up to three. Modular architecture allows for application flexibility, and prevents obsolescence. Currently ISDN, X.21, RS422 and V.35 Digital Interface Modules are available. See Chapter 5 and the ***CDQPrima*** Technical Reference Manual for a description of the available DIMs.